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A NEW SPECIES OF *SISYRINCHIUM* SUBG. *SISYRINCHIUM* (IRIDACEAE) FROM MEXICO

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ABSTRACT

Sisyrinchium novoleonense is described from Nuevo León and Coahuila, México, where it is abundant in areas of relatively high elevation around Cerro Potosí, Peña Nevada, and Sierra de Arteaga. It is a member of subg. *Sisyrinchium* and apparently related to the *S. scabrum* species group, but it clearly stands apart from these plants in its long rhizomes, large flowers with a long filament tube, and habitats at higher elevations. Based on records in LL,TEX, five other species of subg. *Sisyrinchium* are known from Coahuila, Nuevo León, and Tamaulipas: *S. biforme*, *S. micranthum*, *S. dimorphum*, *S. demissum*, and *S. scabrum*. The latter two probably are the closest relatives of *S. novoleonense* but they are more similar between themselves than is either to *S. novoleonense*.

KEY WORDS: *Sisyrinchium*, Iridaceae, México

RESUMEN

Se describe **Sisyrinchium novoleonense** de Nuevo León y Coahuila, México, abundante en areas que sobrepasan los 2700 metros de altitud del Cerro Potosí, Peña Nevada, y Sierra de Arteaga. La nueva especie pertenece al subg. *Sisyrinchium* y aparentemente esta relacionada con el grupo de especies de *S. scabrum*, sin embargo difiere claramente de esta por el mayor tamaño de rizoma, flor, y tubo estaminal y su habitat en elevaciones mayores. Con base en registros en LL,TEX, se conocen cinco especies mas del subg. *Sisyrinchium* de Coahuila, Nuevo León, y Tamaulipas: *S. biforme*, *S. micranthum*, *S. dimorphum*, *S. demissum*, y *S. scabrum*. Aunque los dos últimos son probablemente los mas cercanos a *S. novoleonense*, presentan mayor similitud entre sí que cualquiera de ellos con *S. novoleonense*.

PALABRAS CLAVE: *Sisyrinchium*, Iridaceae, México

Recent studies have contributed greatly to an understanding of the phylogeny and taxonomy of *Sisyrinchium* L. and its close relatives (Rudall *et al.* 1986; Goldblatt *et al.* 1989 and 1990; Goldblatt 1990). *Sisyrinchium* is one of the largest genera within the tribe Sisyrinchieae Baker as well as the whole family, and the genus is well known for seemingly small and variable differences among some of its species. Each of four relatively recent papers (Oliver 1969; Calderón & Rzedowski 1985; McVaugh 1989; Henrich & Goldblatt 1987) has described a new species of *Sisyrinchium* from México, and there are now ca. 32 Mexican species (depending on concepts of species delimitation), seven in subg. *Sisyrinchium* and 25 in subg. *Echthronema* (Herbert) Goldbl. (sometimes treated as the genus *Hydastylus* Salisb.). Three recent treatments have clarified the taxonomy of the genus in the southern half of México, where more than two-thirds of the Mexican species occur (Henrich & Goldblatt 1987; McVaugh 1989; Calderón & Rzedowski 1990). In the course of an attempt to identify the *Sisyrinchium* of northeastern México, particularly in relation to several floristic surveys in progress within the area, it has become evident that the following species of sect. *Sisyrinchium* is undescribed.

Sisyrinchium novoleonense Nesom & L. Hernández S., *sp. nov.* TYPE: MEXICO. Nuevo León: Mpio. Dr. Arroyo, Peña Nevada area, ca. 35 km ENE of Dr. Arroyo, NW slope of Picacho Onofre, 28 Jul 1977, *C. Wells & G. Nesom 394* (HOLOTYPE: LL!).

Sisyrinchio scabro Cham. & Schlecht. similis sed rhizomatibus valde evolutis, floribus paucioribus in quaque spatha, tepalis majoribus, et tubo staminali longiore differt.

Perennials from a short (5-20 mm) rhizome bearing fibrous roots up to 10 cm long, thickened but not fleshy or swollen, slightly tapering distally; herbage glabrous but the leaves and stems usually beset with minute marginal papillae to hairlike teeth. Stems 1-2 per plant, erect, 2-4 dm high, compressed and 2 winged, 2-3 mm wide, slightly bent at the nodes, with 1-2 branch nodes on the upper 1/2-1/3, each node with a leaflike bract and a terminal branch plus 1-2 axillary branches, all branches of equal to subequal length, each bearing a spathe at the apex. Leaves linear, becoming linear-lanceolate near the stem apex, 2-3 mm wide, the basal 7-20 cm long, the cauline (nodal bracts) like the basal but smaller, 5-10 cm long, leaves absent below the nodes. Spathes 1-2(-4) flowered, compressed, narrowly lanceolate-elliptic in outline, 18-25 mm long, 2.5-3.0 mm wide, the bracts ovate, equal to subequal, smooth margined, the outer bract fused 3-6 mm above the base, commonly with a broad hyaline

margin near the base; pedicels erect to slightly spreading in flower and fruit, about the same length as the spathe. Ovary obpyriform, minutely pilose with delicate, glandular hairs; tepals blue to bluish purple, obovate-elliptic, 15-18 mm long, apically rounded to slightly retuse, with an aristate extension up to 1.5 mm long; filaments completely united into a filament tube 6-7 mm long, anthers erect, verticillate and essentially sessile at the summit of the column, 0.8-1.0 mm long, the style branches not or scarcely projecting beyond the tips of the anthers. Fruits ca. 4 mm long, 4-5 mm wide, blocky-globose, truncate at the apex, 3 angled and weakly 3 sulcate; seeds black, obscurely pitted, ca. 1 mm in diameter, with a large depression on one side.

Additional collections examined: MEXICO. Coahuila: Mpio. Arteaga, Las Vigas, Cañon de la Carbonera, Sierra de Arteaga, woods of pine, Douglas fir, fir, oak, and *Ceanothus*, 2100-2600 m, 15 Sep 1988, *Villarreal et al. 4574* (ASU). Nuevo León: Mpios. Dr. Arroyo and Zaragoza, Peña Nevada area: W side of Picacho Onofre, 3230 m, 4 Jul 1959, *Beaman 2692* (TEX); Puerto Mesa del Charco, 3100 m, glade in pine-fir forest, 25 Jun 1978, *Hinton et al. 17368* (TEX); NW slope of Picacho Onofre, 30 Jul 1977, *Wells & Nesom 448* (LL). Mpio. Galeana, Cerro Potosí: SE side, above Ejido 18 Marzo, open pine forest, ca. 3020 m, 25 Jun 1960, *Beaman 3315* (TEX); lower slopes, pine woods, 6-8000 ft, 27 Aug 1987, *Bogler & Atkins 203* (TEX); 8 mi up from 18 de Marzo, pine-oak transition, 24 Aug 1984, *Lavin 4815* (TEX); near microwave tower, 9000 ft, 7 Jul 1963, *McGregor et al. 259* (LL); clearing in pine forest, 3250 m, 8 Aug 1970, *Hinton et al. 17298* (TEX); NE face, oak forest, ca. 2800 m, 24 Jul 1977, *Wells & Nesom 226* (LL): Cerro Potosí area, Mpio. Galeana: San José Las Joyas (N slope of CP), open pine forest, 2730 m, 28 Aug 1983, *Hinton et al. 18584* (TEX); ascent to Sierra Infernillo, ca. 15 mi SW of Galeana, 9-10000 ft, pine savanna, 16 Jun 1934, *Mueller 833* (TEX).

Sisyrinchium novoleonense is clearly a member of subg. *Sisyrinchium* in its blue tepals and sessile stamens borne at the apex of a filament tube. Specimens of the new species have accumulated at LL,TEX under the name of *S. quadrangulatum* Klatt, which is superficially similar in habit, but the latter is a species restricted to central México in the high mountains from Pico de Orizaba (the type locality) in Veracruz and Puebla to Nevado de Toluca in Edo. México (see Rzedowski & Rzedowski 1985). There has been some confusion about the identity of *S. quadrangulatum* (based on variability in dried flower color, Greenman 1903), but as identified and treated by Calderón & Rzedowski (1990), it is a member of subg. *Echthronema* and not at all related to *S. novoleonense*.

Sisyrinchium novoleonense occurs in the areas of Peña Nevada and Cerro Potosí of Nuevo León, and in the Sierra Arteaga of Coahuila, where it occurs mostly at elevations of 2600-3250 meters. It is known from only one collection in Coahuila (slightly north of Cerro Potosí), but it should be expected to occur more abundantly there, as do many other species with a similar pattern

of geographic distribution.

Based on records of specimens in LL,TEX, ca. 11 species of *Sisyrinchium* (acknowledging the caveats below regarding taxonomic difficulties within the *S. scabrum* Schlecht. & Cham. group) in two subgenera are known to occur in the northeastern Mexican states of Coahuila, Nuevo León, and Tamaulipas. In subg. *Sisyrinchium* are the following: *S. novoleonense*, the *S. scabrum* group (*S. scabrum*, *S. dimorphum* R. Oliver, and *S. demissum* E. Greene), *S. micranthum* Cav., and *S. biforme* Bickn. *Sisyrinchium biforme* is a species known from coastal sites in Texas and Tamaulipas, not approaching the more montane habitats of the others. Five species of subg. *Echthronema* that occur in Coahuila, Nuevo León, and Tamaulipas are discussed in a separate paper (Nesom in prep.).

Among Mexican and Texan species of subg. *Sisyrinchium*, the new species is similar to *S. scabrum* in its branched stems, distinctively scabrous leaf and stem margins, and minutely pubescent ovaries. It differs from all other Mexican and Texan plants of subg. *Sisyrinchium* particularly in its large flowers (tepals) and long filament tube. It also differs from *S. scabrum* in its fewer flowers per spathe (mostly 1-2 vs. mostly 2-6). In these features, and with its localized geographic distribution and distinctive habitats, it can be identified without equivocation.

Sisyrinchium scabrum has not been recorded for Texas, but Oliver (1970) noted that *S. ensigerum* Bickn. (the type from Bexar Co., Texas) shows similarities to it in trans-Pecos Texas, and the two probably are conspecific. Both also are similar to *S. dimorphum* (the type from Valverde Co., Texas), which Oliver (1970) distinguished from *S. ensigerum* in its relatively longer stems, spreading-deflexing pedicels shorter than the spathes at anthesis, and its olivaceous color when dried; also, the ovaries of *S. dimorphum* are glabrous, compared to the minutely hairy ones of *S. scabrum* and other close relatives. Plants of both species are very similar in vegetative and floral morphology, lacking well developed rhizomes and with tepals mostly 7-9 mm long and a filament tube 2-3(-4) mm long. Although *S. dimorphum* is primarily endemic to the Edwards Plateau of Texas, it is also known from a few scattered localities in northern Coahuila, Nuevo León, and Tamaulipas. Plants in Chiapas and Guatemala identified as *S. dimorphum* (Henrich & Goldblatt 1987) are more similar in both habit and habitat to *S. biforme* Bickn. and are better identified as the latter, although this needs further investigation. *Sisyrinchium scabrum* is widely distributed in México, from Oaxaca to Veracruz, Nuevo León, and Coahuila and to Jalisco and Chihuahua in the western part of the country. The latter is abundant in Nuevo León where it occurs at relatively low elevations (ca. 1500-2700 m) compared to *S. novoleonense*. There are numerous specimens in LL,TEX of *S. scabrum* collected from the foothills of both Peña Nevada and Cerro Potosí.

Sisyrinchium micranthum Cav., another species of subg. *Sisyrinchium* pe-

ripherally related to *S. scabrum*, is known from a few collections in south-central Nuevo León at the northern limit of its distribution, extending from there southward through San Luis Potosí and Veracruz into Central and South America. It sometimes may appear similar to *S. scabrum*, but plants of *S. micranthum* are annual, without any rhizome, and they generally produce shorter stems with 0-1 branches, reflexing pedicels, mostly glabrous ovaries, and smaller spathes, tepals, anthers, and capsules.

Also closely related to *Sisyrinchium scabrum* is what can be identified in northern Coahuila as *S. demissum* (the type from Arizona). It differs from *S. scabrum* and *S. dimorphum* in its more strongly developed rhizome and erect pedicels that conspicuously exceed the spathe. *Sisyrinchium demissum*, however, produces flowers in the same size range of *S. scabrum* and *S. dimorphum* and appears to intergrade with *S. scabrum*. Further northwest, formal varieties have been recognized within *S. demissum* (Kearney & Peebles 1960), which appears to intergrade with yet other species (Holmgren 1977; Cholewa & Henderson 1984). A more detailed study is needed of the *S. scabrum* group, particularly in northern México and the southcentral United States, before an accurate accounting can be given of the variation patterns and corresponding nomenclature.

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UNA ESPECIE NUEVA DE *KARWINSKIA* (RHAMNACEAE) DE TEHUACAN, PUEBLA, MEXICO[1]

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RESUMEN

Se describe **Karwinskia tehuacana** *sp. nov.* planta endémica, del matorral xerófilo que prosperan en la región de Tehuacán, Puebla. La especie parece tener afinidad con *K. humboldtiana* Zucc.

PALABRAS CLAVE: *Karwinskia*, Rhamnaceae, México, especie nueva

ABSTRACT

Karwinskia tehuacana *sp. nov.* is described from the arid scrub of the region of Tehuacán, Puebla. It is related to *K. humboldtiana* Zucc.

KEY WORDS: *Karwinskia*, Rhamnaceae, México, new species

[1]Trabajo parcialmente subsidiado por la S.E.P. 88-01-03.

En el año de 1988, se colecto una planta del género *Karwinskia* proveniente de Tehuacán, Puebla y al revisar ejemplares depositados en los herbarios de la Escuela Nacional de Ciencias Biológicas (ENCB) y el Herbario Nacional de México (MEXU) provenientes de esta misma zona se observaron ejemplares pertenecientes al mismo taxa que no se pudieron identificar con la ayuda de la literatura ya existente. Al investigar la identidad de esta especie nos percatamos que se trata de una especie nueva para la ciencia y se describe a continuación.

Karwinskia tehuacana Fernández et Waksman, *sp. nov.* TIPO: MEXICO. Puebla: 6 Km al S de Tepeyehualco, 1 Km al W sobre brecha a la Cascada de Acatzitzimitla, municipio de Atoyatempan, cañada con vegetación de matorral xerófilo, sobre suelo calizo, alt. 1850 m, 28-X-1988, *R. Fernández N. 4375* (HOLOTIPO: ENCB; Duplicados por distribuirse).

Arbor vel frutex, 3-8 m altus; folia simplicia, opposita, petioli 3-5 mm longi, limbi ovato elliptici vel ovato lanceolati, 3-5 cm longi, 1.5-2.0 cm lati, margine integri, supra viridis citrinus, glabratus, infra cum nervis elevatus. Cymae umbelliformes axillares 3-4 florae. Drupae globosae 10-12 mm longae.

Arbol o arbusto de 3-8 m de alto, ramas glabras, grisáceas. Hojas simples opuestas, láminas ovado-elípticas a ovado-lanceoladas de 3-5 cm de largo, 1.5-2.0 cm de ancho, haz verde-limón, glabro, el envés ligeramente más pálido y con las nervaduras secundarias muy prominentes, glabro, margen entero, ápice agudo, base aguda a ligeramente redondeada, pecíolos de 3-5 mm de largo, glabros, estípulas deltoides, ca. 0.5 mm de largo, glabras, persistentes. Inflorescencias dispuestas en cimas axilares de 3-4, pedúnculo de 2-3 mm de largo, glabro; copa floral campanulada de ca. 1.5 mm de largo, glabra; sépalos deltoides de 1.0-1.5 mm de largo, 1.2-1.5 mm de ancho, con abundantes motas negras sobre la superficie; pétalos blanco-amarillentos, unguiculados y cimbiformes de 1.3-1.5 mm de largo, 0.8-1. mm de ancho; estambres envueltos parcialmente por los pétalos, anteras café-amarillentas de 0.5-0.8 mm de largo; disco no muy evidente, verdoso, estilo bilobado en el ápice, estigmas dos papilosos. Fruto drupáceo, verde en la juventud, que se torna a rojo y después a negro en la madurez, globoso a subgloboso de 10-12 mm de diámetro. Semillas 2-3 elipsoides de ca. 5 mm de largo, blanco-amarillentas, lisas.

Material adicional examinado: MEXICO. Puebla: Cascadas de Acatzitzimitla, 9 Km al SE de Tepeyehualco, municipio de Atoyatempan, cañada con vegetación de matorral xerófilo, suelos calizos, alt. 1850 m, 17-XI-1984, *R. Fernández N. 2690* (ENCB); cañada de Acatzitzimitla, municipio de Atoyatempan, cañada con vegetación de matorral alto con *Bambusa*, 28-VI-1982,


A
1cm
B
1cm
C
3mm
D
5mm
E
1cm
A. Barbosa 1990

F.G. Medrano 12663 (MEXU); 1 Km al W de Nopala, brecha a Atexcal, municipio de Teontepec, cañada con vegetación de matorral calcicola mixto con *Brahea nitida*, *B. dulcis*, *Dasylirion* sp., 27-IX-1984, *P. Tenorio L. 7455* (ENCB); barranca de Tentzo, 12 Km al W de Molcaxac, carr. a Huatlatlauca, municipio de Huatlatlauca, vegetación de matorral calcicola mixto primario, 22-X-1986, *P. Tenorio L. 12182* (ENCB,MEXU); meseta de San Lorenzo, 8 Km al W de Tehuacán, camino a Tecamachalco, municipio de Tehuacán, vegetación de matorral, 27-VI-1987, *E. Martínez S. 21690* (ENCB,MEXU).

Distribución y habitat: sólo se conoce de la zona de Tehuacán, en sitios con matorral xerófilo, que prosperan sobre suelos calizos.

Periodo de máxima floración: junio-julio. Periodo de máxima fructificación: septiembre-noviembre.

Karwinskia tehuacana se asemeja a *K. humboldtiana* Zucc., especie ampliamente distribuida en México (Fernández 1988), pero difiere conspicuamente en sus hojas y frutos. Las hojas presentan un color verde limón muy llamativo aún en los ejemplares ya herborizados, las nervaduras secundarias del envés se presentan muy resaltadas y el tamaño de los frutos es notablemente más grande. Es muy probable que estas especies presenten una evolución paralela; sin embargo, en estos momentos es difícil tener un esquema de la filogenia del género *Karwinskia*, esperamos en un futuro cercano tener los elementos necesarios para proponer dicho esquema.

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El biólogo Alfonso Barbosa es el autor de la ilustración de este artículo.

LITERATURA CITADA

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OBSERVATIONS ON TOOTHACHE GRASS (*CTENIUM AROMATICUM* [POACEAE: CHLORIDEAE]) WITH PARTICULAR REFERENCE TO FIRE

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ABSTRACT

Ctenium aromaticum is fire dependent. In Louisiana we have observed that flowering is confined to the first postfire growing season. Experiments with mechanical removal of litter produced interesting but not consistent results.

KEY WORDS: *Ctenium aromaticum*, bog, fire, Kisatchie National Forest, Poaceae

During our work on Louisiana bogs (MacRoberts & MacRoberts 1988, 1990a, 1991, 1992), we have had the opportunity to observe the effect of fire, usually by way of prescribed dormant season (winter) burns, on various plant species (MacRoberts & MacRoberts 1990b). One of these is a perennial grass, *Ctenium aromaticum* (Walt.) Wood, coloquially known as toothache grass.

Toothache grass is a common bog species. Its range extends along the southern coastal plain from Virginia to Florida, westward to western Louisiana. *Ctenium* is the dominant ground cover in some of the bogs we have studied (MacRoberts & MacRoberts 1991); while in others it is entirely absent (MacRoberts & MacRoberts 1988, 1990a, 1992). It is a conspicuous grass, growing in clumps. The erect flowering culms are up to 140 cm tall with as many as 40 inflorescences per square meter. In some bogs in western Louisiana there are hundreds of thousands of inflorescences.

We first became aware that there was some relationship between fire and *Ctenium* flowering when we spent a couple of days (15 and 16 June 1990) in the pine savannahs near Lake Ramsay, a few miles northwest of Covington, Louisiana. We noted that in a large savannah bisected by a road, flowering *Ctenium* blanketed the side that had been burned the previous winter; whereas on the other side of the road, which had not been burned, *Ctenium* had not put up any new flowering stems. In another instance, on the unburned

side of a fire line through a savannah there were only old *Ctenium* flowering stems; whereas on the other side, which had been burned only a few months previously, *Ctenium* flowered profusely.

In 1991 we were presented with a test of our earlier observations. In a section of the Kisatchie Ranger District of the Kisatchie National Forest, where we do much of our bog research and where all of the bogs have *Ctenium*, the Forest Service regularly sets prescribed burns. In February 1990, they burned three compartments containing twenty-seven bogs. *Ctenium* bloomed profusely in all of these bogs that summer. In early 1991, the Forest Service burned only one of these three compartments containing $14\frac{1}{2}$ bogs (one bog straddles two compartments and had a fire line through it; another bog only partly burned presumably because of high moisture content). Between July 13 and August 3, 1991, we surveyed these twenty-seven bogs.

The results of the survey were clear: *Ctenium* flowered in profusion in all bogs or parts of bogs burned in 1991; only old stems were present in unburned bogs. The bog that straddles two compartments and the bog that only partly burned provide the test. In both cases, *Ctenium* did not flower in the unburned portions but flowered in the burned portions. Counting the half bogs, 14 ($13 + \frac{1}{2} + \frac{1}{2}$) bogs were burned and flowered, while 13 ($12 + \frac{1}{2} + \frac{1}{2}$) were not burned and did not flower.

We have subsequently made many similar observations on toothache grass in the Kisatchie Ranger District and in the Vernon Ranger District. It is such a consistent indicator of fire history that we now use the condition of *Ctenium* flower stalks (since they do not readily drop) as the best indicator for determining when a bog last burned. New flower stalks signify that it was burned since the last growing season, old but standing flower stalks indicate one year past, bedraggled stalks indicate that an area was burned two years ago, and no stalks but leaf clumps that it was burned three or more years ago.

In order to further test the relationship between fire and *Ctenium* (flowering on January 4 and 11, 1992) we established 22 permanent one meter square plots in *Ctenium*-rich areas of eight bogs in the Kisatchie Ranger District. Each plot was sickled and carefully raked to remove litter. In bogs where it is present, *Ctenium* is the major source of litter, which is often so deep that it obscures the ground. All plots were established in bogs that had the same fire history; they had been burned two years ago. Four of the bogs (11 plots) were burned in early February 1992, while the other four bogs (11 plots) were not burned. The nonplot portions of all bogs acted as the control. Our purpose was to see whether the removal of litter without fire would have the same effect as its removal by fire (see Facelli & Pickett 1991).

On June 6, 1992, when the *Ctenium* in the burned bogs was in full flower we examined all of the plots. The *Ctenium* in unburned plots did not put up inflorescences (nor did any of the *Ctenium* elsewhere in these bogs), while *Ctenium* in plots in burned bogs flowered (as did *Ctenium* throughout these

bogs). On June 6, the plots in both burnt and unburnt bogs were open: bare soil and small forbs, such as *Drosera*, *Chaptalia*, *Utricularia*, and *Xyris*, were visible. The absence of litter, therefore, does not seem to be the controlling factor in *Ctenium* flowering. What was somewhat surprising was that the *Ctenium* in the cleared plots in burned bogs flowered even though these plants could not have burned much since most of the litter had been removed. How hot the fire became in such plots is not known, but perhaps close proximity to high temperatures produced by adjacent litter may have helped to produce the effect. Larger plots might have shown a central/peripheral effect (eliminating the possibility of an edge effect) and should be considered in future studies. However, in our experience, one meter plots should be sufficiently large since, in bogs that have not completely burnt, at the burn edge there is always a sharp line of flowering and nonflowering *Ctenium* within inches of one another.

While it is a common observation that winter or spring burns usually stimulate greater growth and flowering in grasses, flowering entirely confined to the first postfire growing season is apparently rare (Biswell & Lemon 1943, Daubenmire 1968, Komarek 1974, Vogl 1974, Knapp & Seastedt 1986, Stolzenburg 1991, Christensen 1988, Robbins & Myers 1989). This apparent dependence in *Ctenium*, insofar as we have been able to discover, has not been previously reported (but see comments by Grelen & Hughes 1984:46).

The relationship of *Ctenium* and fire may not be so simple as this, however. Steve Orzell and Edwin Bridges (pers. comm). report that, while both nongrowing season and growing season burns produce a dramatic display of flowering in *Ctenium*, they have seen individual plants flower in areas where there has not been any recent fire. While Orzell & Bridges do not give quantitative data, out of the tens of thousands of plants we have observed, we have only seen a few that had bloomed in the absence of fire.

However, let us make one caveat to the above. When we initially established our meter plots to determine if mechanical clearing affected flowering, we established some backup plots on the Vernon Ranger District of the Kisatchie National Forest 60 km to the south of our study plots. We did not re-examine these since they were not needed. But as fate would have it, we had a potted *Ctenium* plant at our home and it produced a single flower stalk in late July. This plant had not been burned. We therefore decided that we should check our plots to see if flowering might be delayed. We examined five of the Vernon Ranger District backup plots on August 4. The bogs in which they were established had not been burned the previous year and there were no new flower stems. But in the five plots, there were 0, 1, 3, 9, and 25 stems in flower. None of these plots showed any ground disturbance additional to the mechanical clearing we had done or any other factors that might account for flowering. Although this is a drastic reduction in flowering as compared to burned plots, it is flowering nonetheless. The next day we re-examined all 11 plots on the Kisatchie Ranger District. None had flowers!

Clearly, additional observations are required to establish the factors involved in stimulating flowering in *Ctenium*. Perhaps there are regional or site specific differences affecting or complicating *Ctenium* flowering as appears to be the case with other grasses (*e.g.*, Robbins & Myers 1989), factors that would be interesting to explore further.

It has long been thought that southeastern bogs and savannahs, like many other plant communities within the longleaf pine ecosystem, are maintained by fire (Folkerts 1982, Smith 1991, Frost *et al.* 1986, Martin & Smith 1991, Platt *et al.* 1988, Robbins & Myers 1989, Bridges & Orzell 1989, Noss 1988, Olsen 1992). The existence of a fire dependent species like *Ctenium aromaticum*, which is fidel to bogs and wet savannahs, certainly strengthens this view.

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STUDIES ON THE GENUS *BIDENS* L. (COMPOSITAE) FROM THE EASTERN HEMISPHERE. 4. A NEW SPECIES FROM ETHIOPIA

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ABSTRACT

A new species, **Bidens kefensis** T.G.J. Rayner, is described from the Kefa administrative region of Ethiopia. It is shown to be a very distinctive taxon, perhaps most closely related to *B. ugandensis* (S. Moore) Sherff from which it is primarily distinguished by its fewer ray florets, annular thickening at the base of the limb of the disc floret corollas, and dorsally produced cartilaginous corona of the cypselas.

KEY WORDS: *Bidens*, Compositae, taxonomy, Ethiopia

During continuing revisional studies of Eastern hemisphere *Bidens*, a collection from Ethiopia with distinctive capitular characters was discovered among specimens housed at MO and WAG. An examination of the revision of *Bidens* in northeastern tropical Africa by Mesfin (1984) has failed to reveal any species possessing the same characters. Thus it is here described as a new species.

Bidens kefensis T.G.J. Rayner, *sp. nov.* TYPE: ETHIOPIA. Kefa administrative region, about 10 km SW of Jima, 18 Dec. 1965, *W.J.J.O. de Wilde, cum suis, 9266* (HOLOTYPE: WAG; Isotypes: MO,WAG).

Species nova haec similis *Bidenti ugandensi* (S. Moore) Sherff sed ab ea differt plantis tantum usque ad centum viginti centimetra altis, caulibus simplicibus aut ad basem ramosis, foliis omnibus oppositis, laminis foliorum indivisis aut lobatis non pinnatisectis, involucris glabris aut ad basem sparsim hispidis-pubentibus, phyllariis exterioribus uniseriatis linearibus supra parum dilatatis aut linearibus-oblanceolatis, flosculis radii sex aut septem, corollis flosculorum disci ad basem limbi annulare parum incrassatis,

filis staminum tantum 0.7-1.4 millimetris longis, ramis stigmatum solummodo 1.0-1.2 millimetris longis, cypselis tantum 3.5-4.4 millimetris longis, apice glabris et corona straminea cartilaginea dorsaliter producta usque ad 0.35 millimetri longa 0.7 millimetri lata instructis, aristis cypselarum (ubi adsunt) nudis tantum usque ad 0.4 millimetri longis, carpopodio cartilagineo parum dorsaliter producto usque ad 0.2 millimetri longo basi instructis.

Perennial herbs, to 0.8-1.2 m tall; stems arising from a woody rootstock, sometimes prostrate below, erect above, simple or branched at base; stems and branches more or less terete or subtetragonal above, 1.6-2.4 mm diam. near base, to 0.6-1.3 mm diam. beneath peduncles, striate-sulcate above, somewhat irregularly sulcate below, dark brown toward base, becoming pale green or pale green-yellow above, woody from base up to ca. 1/3 of length of stem, glabrous or, especially above, with isolated, minute (ca. 0.1-0.2 mm long), erect, uniseriate, few-cellular hairs. Leaves decussate, sessile, 0.4-7.4 cm long × 0.8-6.8 mm wide, the largest generally toward the middle, more or less gradually reduced above and below, linear or narrowly ovate linear to narrowly elliptic in outline; apex acute to subacute, callose indurated; bases narrowly cuneate from about middle of lamina or below, connate; margin entire or serrate to serrate incised or more rarely deeply linear lobed, sometimes slightly revolute or involute and callose indurated; teeth or lobes 1-3 on each side, 0.8-6.2 mm long, acute, callose indurated and slightly mucronate; lamina somewhat coriaceous, pale olive-green, faces glabrous or sparsely hispidulous, margin with more or less 2 rows of antrorse, hispidulous hairs especially in the upper half of the leaf. Capitula radiate, heterogamous, erect, 2.7-3.8 cm diam. × 6-7 mm high at anthesis, to 9 mm high in fruit, solitary or 2-3 in lax cymes at apices of stems and branches; receptacles flat or slightly convex; peduncles to 2.6-9.8 cm long, very slender, 0.3-0.6 mm diam. at anthesis, to 0.9 mm diam. in fruit, tetragonal to more or less terete, striate-sulcate, glabrous or sparsely pubescent, sometimes somewhat densely pubescent in upper part; ebracteate or with 1-3 alternate bracts resembling the outer phyllaries. Involucre depressed hemispheric, glabrous or sparsely hispid-pubescent at base; outer phyllaries uniseriate, 7-9, linear and slightly dilated above to narrowly obovate linear, with a subacute to obtuse, callose indurated and mucronulate apex, entire at margin, 3.2-3.7 mm long × 0.7-0.8 mm wide at anthesis, to 4.3 mm long in fruit, erect, green, sometimes darkened at apex, with 1-3 red nerves, glabrous; inner phyllaries uniseriate, 6-7, ovate to ovate elliptic and often attenuate from about middle, subabruptly narrowed near the more or less acute to subobtuse apex, 4.1-5.0 mm long × 1.6-1.9 mm wide at anthesis, to 6.1 mm long × to 2.3 mm wide in fruit, erect, membranous, dark brown to stramineous or yellow, darkest toward base and at apex, with 10-15 red-brown nerves, glabrous or dorsal surface sparsely pubescent chiefly along the median

nerve or somewhat densely so especially toward the puberulous apex. Ray florets 6-7, neuter; ovary more or less oblong, 1.0-1.3 mm long × 0.7-0.8 mm wide, glabrous, exaristate, style absent; corolla tube 1.4-1.8 mm long, glabrous or more or less pubescent; ray yellow or yellow orange, oblong to elliptic or ovate oblong, 1.4-1.5 cm long × 5.3-5.8 mm wide, with 8-13 red-brown nerves, glabrous; apex rounded or subobtuse, entire or subentire to slightly cuspidate or emarginate, sinus to 0.3 mm deep. Paleae narrowly oblong or narrowly elliptic-oblong, gradually attenuate above to the subacute to obtuse or somewhat rounded and often slightly mucronate apex, entire at margin, 4.5-6.0 mm long × 0.8-0.9 mm wide at anthesis, to 6.6 mm long in fruit, membranous, glabrous, pale yellow, slightly darkened toward apex, with 1-3 pairs of red or orange brown nerves, especially the central pair darker above, the lateral pairs sometimes coloured only toward middle. Disc florets 22-31; corolla yellow or orange yellow, glabrous or lobes dorsally sparsely pubescent; limb campanulate, 2.4-2.6 mm long × 1.0-1.4 mm wide, slightly annularly thickened at base, apex (4-)5 lobed; lobes triangular, acute at apex, 0.5-0.6 mm long × 0.5-0.6 mm wide at base, papillate on margin; limb gradually or subabruptly attenuate below into a narrow, 1.1-1.2 mm long × 0.4-0.5 mm wide, terete tube; anthers 1.8-2.0 mm long × 0.5-0.8 mm wide, brown; endothecial tissue with polarized thickening; apical appendages narrowly ovate-triangular, obtuse at apex, 0.4-0.5 mm long × 0.25-0.30 mm wide, often with a dark brown longitudinal median nerve, margins recurved; basal appendages sagittate, not or just reaching base of the filament collar; collar 0.5-0.6 mm long × 0.15-0.20 mm wide; filament 0.7-1.4 mm long, involute; style 3.7-5.5 mm long, bulbous or at least slightly dilated at base, with caudate, 1.0-1.2 mm long branches; stylopodium cylindric. Cypselas unwinged but margin usually with a narrow (to 0.05 mm wide) and often interrupted, light brown, cartilaginous extension; body oblong or oblong elliptic, 3.5-4.4 mm long × 1.3-1.7 mm wide, grey-black, strongly compressed, dorsal face convex or somewhat carinate, ventral face concave with a raised median rib, both faces 4 to 10 striate-sulcate and glabrous or subsparsely erect setose chiefly above, the setae often arising from light brown tubercles, margins more or less densely erect setose, the setae generally becoming slightly longer toward the apex; apex surmounted by a corona, glabrous; corona stramineous, cartilaginous, dorsally produced, slightly flattened, laterally biaristate or rarely exaristate, to 0.10-0.35 mm tall × 0.5-0.7 mm wide; aristae erect or slightly divergent, rounded-trigonous at base, subulate above, pale yellow, to 0.15-0.40 mm long × ca. 0.06 mm wide at base, nude; base of cypsela with a short (to 0.1-0.2 mm long), slightly dorsally produced, cartilaginous flaplike carpopodium.

Bidens kefensis is apparently endemic to the highlands of southwestern Ethiopia, being known at present only from the type locality near Jima. It was described by de Wilde as growing in a marshy place at an altitude of ca. 1800 m.

It is a distinctive species with no known near relatives in Ethiopia, and is perhaps most closely related to *Bidens ugandensis* (S. Moore) Sherff from western central Africa. *Bidens kefensis*, however, differs from this species in the following ways: stems only to 1.2 m tall (to 2.3 m tall in *B. ugandensis*), simple or branched at base (not sometimes branched above); leaves all opposite (not uppermost sometimes alternate), with lamina undivided or lobed (not often pinnatisect); involucre glabrous or sparsely hispid pubescent at base (not densely hispid at base); outer phyllaries 1 seriate (not 1 to 2 seriate), linear and slightly dilated above or linear-oblanceolate (not linear to narrowly ovate or narrowly elliptic); ray florets 6-7 (not 8-16); corolla of disc florets slightly annularly thickened at base of limb (not unthickened); filaments of the stamens 0.7-1.4 mm long (not 3.6-4.4 mm long); stylar branches 1.0-1.2 mm long (not 1.4-2.2 mm long); cypselas 3.5-4.4 mm long (not 4.3-14.1 mm long), apex glabrous, with a stramineous, cartilaginous, dorsally produced, to 0.35 mm long × to 0.7 mm wide corona (not subsparsely to somewhat densely erect setose); aristae to 0.4 mm long, nude (not to 3.1 mm long and often barbed); base of cypsela with a cartilaginous, slightly dorsally produced, to 0.2 mm long carpopodium (not hollow and encircled by a cartilaginous, to 0.4 mm long carpopodium).

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THE GOLDENASTERS OF CALIFORNIA, *HETEROTHECA* (COMPOSITAE: ASTEREAE): NEW NAMES AND COMBINATIONS

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ABSTRACT

Extensive field work and herbarium specimen studies on the goldenasters of California indicated that a number of new names and combinations are required. The following new names and combinations are proposed: **Heterotheca sessiliflora** (Nutt.) Shinners ssp. **bolanderi** (A. Gray) Semple, **H. sessiliflora** ssp. **echioides** (Benth.) Semple, **H. sessiliflora** ssp. **echioides** var. **bolanderioides** Semple, **H. sessiliflora** ssp. **echioides** var. **camphorata** (Eastwood) Semple, **H. sessiliflora** ssp. **fastigiata** (E. Greene) Semple, **H. sessiliflora** ssp. **fastigiata** var. **sanjacintensis** Semple, **H. villosa** (Pursh) Shinners var. **scabra** (Eastwood) Semple, **H. villosa** var. **shevockii** Semple.

KEY WORDS: *Heterotheca*, Compositae, Astereae, California, Goldenasters

The following new combinations and names are required for use in the forthcoming *The Jepson Manual, Higher Plants of California* (J.C. Hickman, ed. 1993). Justification for the nomenclatural changes and additions will be presented in full elsewhere. Nomenclatural changes are based on examination of hundreds of herbarium specimens, field work conducted over a ten year period, and multivariate morphometric analyses of the *Heterotheca sessiliflora* and *H. villosa* complexes. All specimens cited below, including types, were examined during the course of the study.

Heterotheca sessiliflora (Nutt.) Shinners ssp. **bolanderi** (A. Gray) Semple, *comb. et stat. nov.* BASIONYM: *Chrysopsis bolanderi* A. Gray, Proc. Amer. Acad. Arts 6:543. 1866. *Chrysopsis villosa* (Pursh) Nutt.

var. *bolanderi* (A. Gray) A. Gray, *Syn. Fl. N. Amer.* 1(2):123. 1884. *Heterotheca bolanderi* (A. Gray) Harms, Brittonia 26:61. 1974. TYPE: U.S.A. California: Oakland Hills near San Francisco, 1863, *Bolander 2466* (HOLOTYPE: GH; Isotypes: K,US).

Heterotheca sessiliflora (Nutt.) Shinners ssp. **echioides** (Benth.) Semple, *comb. et stat. nov.* BASIONYM: *Chrysopsis echioides* Benth., *Bot. Voy. Sulphur* 25. 1844. *Chrysopsis villosa* (Pursh) Nutt. var. *echioides* (Benth.) A. Gray, *Syn. Fl. N. Amer.* 1(2):123. 1884. *Heterotheca echioides* (Benth.) Shinners, Field & Lab. 19:71. 1951. TYPE: U.S.A. California: Bodegas, *Hinds s.n.* (HOLOTYPE: K).

Heterotheca sessiliflora (Nutt.) Shinners ssp. **echioides** (Benth.) Semple var. **bolanderioides** Semple, *var. nov.* TYPE: U.S.A. California: Contra Costa Co., Charles Tilden Reg. Park, Vollmer Peak. Scattered population along ridge top, in rocks and loose gravel in grassy area between shrubs, 16 Aug 1990, $2n = 36$, *Semple, Suripto, & Ahmed 9339* (HOLOTYPE: UC; Isotypes: CAN,CAS,MO,NY,RSA,WAT).

Heterotheca sessiliflora (Nutt.) Shinners ssp. *echioides* (Benth.) Semple var. *echioides* accedens sed foliis intermediusque interdum dense strigosibus longibus, involucris grandibus, capitulescentiis corymbiformibus compactibus.

Perennial from stout woody taproots, the stems several to many, ascending-erect, 17-45 cm tall, sparsely to densely strigose-hispid, the hispid hairs fewer than the shorter appressed ones, sometimes becoming more glandular and sparsely pubescent above. Lower stem leaves oblanceolate, 15-45 mm long, 4.5-10. mm wide, subpetiolate to sessile, cuneate, acute, mucronate, moderately to densely hispid-strigose on both surfaces; margins entire, strigose, longest hispid hairs near base, not undulate. Upper stem leaves lanceolate to elliptic, sessile, slightly reduced upward, 11-35 mm long, 3.5-7.5 mm wide, sparsely to densely villous-strigose (5-80 hairs/mm^2), moderately to densely glandular (7-40 glands/mm^2), acute to obtuse, mucronate. Capitulescence cymose-paniculiform, heads (1-)4-16; peduncles as upper stems to more glandular, bracts few, lower ones oblanceolate, like leaves, sometimes reduced upward to < 5 mm, those immediately below head 4-11 mm long, 0.8-4.0 mm wide. Involucres cylindrical to campanulate when fresh, campanulate-hemispheric upon drying, (7-)8-11(-12) mm tall; phyllaries in 4-5 imbricate series, outer 1/4-1/3 length of inner, narrowly triangular; mid series lanceolate, sparsely

to moderately glandular, sparsely to moderately strigose, margins hyaline, fimbriate-ciliate apically; inner ones similar. Ray florets 7-16, strap yellow, 4.5-10. mm long, 0.7-2.4 mm wide. Disc florets 28-70, yellow, glabrous, corolla barely ampliate, 5.5-7.5 mm long, lobes 0.4-1.0 mm long, sparsely strigose, hairs 0.3-0.7 mm long. Achenes 3-4 mm long, moderately to densely strigose; pappus off white, double, outer whorl of a few linear scales 0.25-0.50 mm long, inner whorl of 35-45 barbellate bristles 5.5-8.0 mm long. Chromosome number: $2n = 36$.

PARATYPES: U.S.A. California: Santa Clara Co.: Page Mill Rd. NE of CA-35, 21 Sep 1987, *Semple & Chmielewski 8915* (WAT). Marin Co.: San Geronimo, grass covered rocky ridge N. of golf course, common on slope above and below Nicasio valley road, large number of plants, 15 Aug 1990, *Semple, Suripto, & Ahmed 9333* (WAT). Santa Cruz Co.: W of Palo Alto, CA-35 17.5 km SE of CA-84, Semple & Chmielewski 8918 (WAT); CA-35 NW of Saratoga, high elevation, *Semple & Semple 5670* (JCS-personal herbarium, MO,MT,UC,USF,WAT). [Additional duplicates to be distributed].

Variety *bolanderioides* is endemic to serpentine soils mostly on hill and mountain tops surrounding San Francisco Bay. As the name indicates, it is similar to ssp. *bolanderi* in which most collections of the taxon have been placed in the past. Individuals of var. *bolanderioides* can be similar in indument to diploid (rarely tetraploid) var. *camphorata*, which has relatively few hairs (for the ssp.) on its upper stem and rameal leaves, and to diploid var. *echioides*, which usually has a leaf indument of dense hispid and strigose hairs obscuring the underlying glands and smaller involucres. It is uncertain whether var. *bolanderioides* is a tetraploid derivative of var. *echioides* or whether it may be an allopolyploid involving ssp. *echioides* and ssp. *bolanderi*.

Heterotheca sessiliflora (Nutt.) Shinners ssp. **echioides** (Benth.) Semple var. **camphorata** (Eastwood) Semple, *var. nov.* BASIONYM: *Chrysopsis camphorata* Eastwood, Zöe 5:81. 1900. *Chrysopsis villosa* (Pursh) Nutt. var. *camphorata* (Eastwood) Jepson, *Man. Fl. Pl. Calif.* 1036. 1925. *Heterotheca camphorata* (Eastwood) Semple, Canad. J. Bot. 58:148. 1980. TYPE: U.S.A. California: Santa Cruz Co.; Glenwood, Jul 1900, *Davis s.n.* (HOLOTYPE: CAS; Isotypes: DS,GH(2),NY(2),RM(3),UC, US).

Heterotheca sessiliflora (Nutt.) Shinners ssp. **fastigiata** (E. Greene) Semple, *comb. et stat. nov.* BASIONYM: *Chrysopsis fastigiata* E. Greene, Pittonia 3:296. 1898. *Chrysopsis villosa* (Pursh) Nutt. var. *fastigiata* (E. Greene) H.M. Hall, Univ. Calif. Publ. Bot. 3:43. 1907. *Heterotheca fastigiata* (E. Greene) Harms, Brittonia 26:61. 1974. TYPE:

U.S.A. California: San Bernardino Mts, 1000-1500' [not 10000-15000 as in protologue], 15 Oct 1895, *Parish 3815* (HOLOTYPE: NDG; Isotypes: CAS,GH,UC,US).

Heterotheca sessiliflora (Nutt.) Shinners ssp. **fastigiata** (E. Greene) Semple var. **sanjacintensis** Semple, *var. nov.* TYPE: U.S.A. California: Riverside Co., CA-243 just S of Idyllwild Park at Manzanita Drive, 30 Sep 1987, $2n = 9_{II}$, *Semple & Chmielewski 8982* (HOLOTYPE: WAT; Isotypes (all shoots from same plant): CAS,MT,NY,RSA,UC).

Heterotheca sessiliflora (Nutt.) Shinners ssp. *fastigiata* (E. Greene) Semple var. *fastigiata* accedens sed foliis utrinque sparsusque vel intermediusque interdum densis strigosibus et hispidibus, utrinque intermediusque vel densis glandulibus, viridibus non albibus nec canescentibus.

Perennial from stout woody taproots, the stems several to many, ascending-erect, 35-105 cm tall, moderately appressed strigose-hispid (hairs often broken off), becoming densely glandular and moderately pubescent above. Lower stem leaves oblanceolate, 12-38 mm long, 3-8 mm wide, subsessile, cuneate, acute, moderately (rarely densely) hispid-strigose on both surfaces; margins entire, strigose, longer hispid hairs near base, undulate. Upper stem leaves lanceolate, sessile, reduced upward, 11-20 mm long, 3.5-6.5 mm wide, sparsely to densely glandular (6-42 glands/mm^2), sparsely to densely short strigose (27-150 hairs/mm^2), margins usually distinctly undulate. Capitulescence cymose-paniculiform, branches ascending, heads 5-60. Peduncles densely glandular, bracts few, lower ones lanceolate, leaflike, reduced upward to 0.5-1.5 mm long, 0.3-1.0 mm wide, phyllarylike. Involucres cylindrical to turbinate when fresh, campanulate upon drying, 7.5-12. mm high; phyllaries in 5-6 imbricate series, outer 1/5-1/4 length of inner, mid series narrowly triangular, moderately glandular, very sparsely strigose, margins hyaline, fimbriate-ciliate apically. Ray florets 5-13, strap yellow, 3.5-5.0 mm long, 0.8-1.8 mm wide. Disc florets 25-45, yellow, corolla somewhat ampliate, 5.3-7.5 mm long, lobes 0.4-0.8 mm long, sparsely pilose, hairs 0.25-0.50 mm long. Achenes 2-3 mm long, moderately strigose; pappus off white, double, outer whorl of a few linear scales 0.25-0.50 mm long, inner whorl of 25-40 barbellate bristles 6-8 mm long. Chromosome number: $2n = 18$.

PARATYPES: U.S.A. California: Riverside Co.: CA-243 just S of Idyllwild Park at Manzanita Drive, 30 Sep 1987, $2n = 9_{II}$, *Semple & Chmielewski 8981* (Each shoot from a separate plant: CAN,CAS,DAO,JCS-personal herbarium,MO,OBI,RM,RSA,SD,UC,WAT).

Variety *sanjacintensis* is endemic to the San Jacinto Mountains and Mt. Palomar areas of southern California. It has a capitulescence form and very undulate stem leaves that are similar to var. *fastigiata*, but its leaves are far less densely strigose than those of var. *fastigiata* and the hairs are somewhat longer. Individuals with less undulate leaves are similar to var. *camphorata* of ssp. *echioides*, which occurs much farther north in California in the Coastal Range from San Mateo to San Luis Obispo counties.

Heterotheca villosa (Pursh) Shinners var. **scabra** (Eastwood) Semple, *comb. nov.* BASIONYM: *Chrysopsis villosa* (Pursh) Nutt. var. *scabra* Eastwood, Proc. Calif. Acad. Sci., ser. 2. 6:294. 1896. TYPE: U.S.A. Utah: San Juan Co., near head of Willow Creek, *Eastwood s.n.* (HOLOTYPE: CAS).

Chrysopsis viscida (A. Gray) E. Greene ssp. *cinerascens* S.F. Blake, Proc. Biol. Soc. Wash. 35:173. 1922. *Heterotheca horrida* (Rydb.) Harms ssp. *cinerascens* (S.F. Blake) Semple, Brittonia 39:381. 1987. TYPE: U.S.A. Utah: Beaver Canyon, among rocks in the oak region, 2 Sept 1909, *Tidestrom 2873* (HOLOTYPE: US).

Semple (1987) discussed this taxon under the synonym *Heterotheca horrida* ssp. *cinerascens*. Additional work on the genus and the *villosa* complex (Semple 1990) resulted in treatment of *H. horrida* as a synonym of *H. villosa* var. *hispida* (Hook.) Harms. At the varietal level Alice Eastwood's epithet has priority over a combination based on Blake's epithet.

Heterotheca villosa (Pursh) Shinners var. **shevockii** Semple, *var. nov.* TYPE: U.S.A. California: Kern Co., Kern R. Canyon, Bodfish, CA-178 at Bodfish-Havilah Rd., off of off-ramp, ca. 850 m el., 16 Nov 1981, *Shevock 9110* (HOLOTYPE: CAS; Isotype: WAT).

Heterotheca villosa (Pursh) Shinners var. *hispida* (Hook.) Harms accedens sed caulis altae, foliae deltoideae-lanceolatae, glandulissimae, acutae, marginibus plerumque involutibus, involucellis grandibus; chromosomatum numerus $2n = 36$.

Perennial from stout woody taproots, the stems several to many, ascending-erect, 25-135 cm tall, sparsely strigose, moderately hispid (hairs often broken off in older stems), becoming densely glandular and sparsely hispid-strigose above. Lower stem leaves oblanceolate to lanceolate, 25-55 mm long, 8-26 mm wide, subpetiolate to sessile, cuneate, acute, mucronate, moderately hispid-villous on both surfaces; margins entire, strigose, longer hispid hairs near base.

Upper stem leaves linear lanceolate to lanceolate, sessile, base abruptly tapering, reduced upward, densely glandular, sparsely villous-strigose. Rameal leaves much reduced upward, becoming linear to linear oblanceolate. Capitulescence cymose-paniculiform, heads 3-70, branches elongated in robust shoots. Peduncles long, densely glandular, sparsely hispid-strigose, bracts few, lower ones leaflike, greatly reduced upward, becoming linear to oblanceolate, margins with long hispid hairs. Involucres cylindrical to turbinate when fresh, campanulate upon drying, 9-13 mm tall; phyllaries in 5-6 imbricate series, outer 1/5-1/4 length of inner, narrowly triangular, densely glandular, sparsely strigose especially along the pronounced midvein, margins hyaline, fimbriate-ciliate apically; midseries linear lanceolate to linear oblanceolate, moderately hispid apically, margins similar to outer series. Ray florets 9-14(-18), strap yellow, 5-10 mm long, 0.8-2.0 mm wide. Disc florets (31-)41-68(-77), yellow, glabrous, corolla barely ampliate, 5.4-7.5 mm long, lobes (0.4-)0.5-0.9(-1.1) mm long, glabrous or very sparsely strigose, hairs 0.04-0.27 mm long. Achenes 3.5-4.5 mm long, moderately strigose; pappus off white, double, outer whorl of a few linear scales 0.25-0.50 mm long, inner whorl of 35-45 barbellate bristles 5-7 mm long. Chromosome number: $2n = 36$.

PARATYPES: U.S.A. California: Kern Co., Kern R. Canyon, CA-178 8.2 km SE of CA-155, edge of rd. below rock cut, 26 Sept 1987, *Semple & Chmielewski 8953* (CAS,JCS-personal herbarium,NY,RSA,UC,WAT); CA-178 25.4 km SW of CA-155, Democrat Hot Springs, Democrat Raft Removal Area, 26 Sept 1987, *Semple & Chmielewski 8954* (CAS,RM,RSA,WAT); just E of Miracle Hot Springs, Sequoia Nat'l For. - NE end of Hobo Campground, 18 Aug 1990, *Semple, Suripto, & Ahmed 9363* (WAT); CA-178, ca. 1.5 mi E of Rich Bar, 1000 ft. el., 16 Nov 1981, *Shevock 9105* (CAS). [Additional duplicates to be distributed].

Shevock's Goldenaster is named for James Shevock, an expert on the flora of Kern County, California, who collected the taxon several times in the Kern River Canyon area and who provided valuable personal communication on its habit and habitat. The var. *shevockii* is distinguished from other races of the species by its usually tall stems and lanceolate-deltoid leaves with inrolled margins. Smaller plants are similar to *Heterotheca villosa* var. *scabra* to which var. *shevockii* is undoubtedly closely related. In California, var. *scabra* is known only from a few locations in the Little San Bernardino Mountains (1200-1300 m el.), var. *hispida* occurs in the Sierra Nevadas, the Cascade Mountains and on lava flows in Lassen and Modoc counties (600-3100 m el.), while var. *shevockii* is endemic to the Kern River Canyon (400-900 m el.) in the Greenhorn Mountains. As with all races of *H. villosa* (Semple 1990), in typical form var. *shevockii* is readily recognized, but depauperate and atypical individuals are not easily separated from similar taxa, *i.e.*, var. *hispida* and var. *scabra*.

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Phytologia (December 1992) 73(6):456-459.

BOISDUVALIA, A COMA-LESS *EPILOBIUM* (ONAGRACEAE)

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ABSTRACT

Evidence from independent analyses of morphological and molecular variation in tribe Epilobieae shows no support for the continued recognition of *Boisduvalia* Spach. Absence of seed comas, the only consistent diagnostic feature of the genus relative to *Epilobium*, now appears to be a secondary loss; other characters reveal a close relationship of *Boisduvalia* to taxa within *Epilobium*. Therefore, all species of *Boisduvalia* are transferred to *Epilobium*, in order better to reflect phylogeny.

KEY WORDS: Onagraceae, *Epilobium*, *Boisduvalia*, New World

Tribe Epilobieae (Munz 1965; Raven 1976) is marked within Onagraceae as monophyletic by probable base chromosome number of $x = 9$ (Raven 1976, 1979), commissural stigmas (Eyde 1982), and dry type stigma surface (Heslop-Harrison 1990); most species (excluding mainly *Epilobium* sect. *Chamaenerion*) also have pollen released in tetrads (Skvarla *et al.* 1978). The tribe traditionally has comprised *Epilobium* (including sections *Chamaenerion* and more recently *Zauschneria*), characterized by the synapomorphy of seed comas (tufts of hair on the chalazal end of the seed), and *Boisduvalia* (Raven & Moore 1965), an entirely annual genus that lacks comas. Recent phylogenetic analyses of the tribe using either morphological data (Hoch & Crisci, in prep.) or variation in chloroplast DNA (Baum *et al.*, in prep.) have revealed relationships among the taxa that are not reflected in the current taxonomy. Even though the exact relationships proposed among the taxa differ between these two studies, both demonstrate convincingly that recognition of *Boisduvalia* as a genus is not supported and that continuing to recognize it renders *Epilobium* paraphyletic.

These studies strongly suggest that *Boisduvalia* evolved from taxa with a coma. By analogy in support of that suggestion, two species of *Epilobium* and populations of a third have secondarily lost their comas (Munz 1965; Raven

& Raven 1976; Seavey *et al.* 1976). Other characters that mark species or groups of species in *Boisduvalia* include capsule specializations and seed shape, but these may be associated with the loss of the coma and may be viewed more accurately as apomorphies within the group, rather than plesiomorphies within the tribe. Consequently, we here propose that *Boisduvalia* be placed in synonymy with *Epilobium*, and make the necessary nomenclatural changes, in order to make the names available for floristic treatments in progress.

The following nomenclatural changes include only names relevant to the transfers. For more complete synonymy of *Epilobium* and the sections, see Raven (1976); for complete synonymies of all species being transferred from *Boisduvalia*, see Raven & Moore (1965).

Epilobium L., *Sp. Pl.* 347. 1753.

Epilobium sect. **Boisduvalia** (Spach) Hoch & Raven, *comb. nov.* BASIONYM: *Boisduvalia* Spach, *Hist. Nat. Vég.* 4:383. 1835. *Oenothera* L. sect. *Boisduvalia* (Spach) Torr. & A. Gray, *Fl. N. Amer.* 1:505. 1840. *Onothera* group *Boisduvalia* (Spach) H. Lév., *Monogr. Onothera* 296. 1908. TYPE: *Epilobium concinnum* (D. Don) Hoch & Raven.

1. **Epilobium concinnum** (D. Don) Hoch & Raven, *comb. nov.* BASIONYM: *Oenothera concinna* D. Don *in* Sweet, *Brit. Fl. Gard.* II, pl. 183. 1833. *Boisduvalia concinna* (D. Don) Spach, *Hist. Nat. Vég.* 4:384. 1835. *Onothera subulata* (Ruiz & Pavón) H. Lév. race *concinna* (D. Don) H. Lév., *Monogr. Onothera* 298. 1908. TYPE: Sweet, *Brit. Fl. Gard.* II, pl. 183. 1833; plant raised from seeds sent from Chile by H. Cuming (LECTOTYPE, designated by Raven & Moore [1965]).

   Boisduvalia subulata (Ruiz & Pavón) Raim. *in* Engl. & Prantl, *Nat. Pflanzenfam.* III. 7:212. 1893. *Oenothera subulata* Ruiz & Pavón, *Fl. Peruv. Prodr.* 3:82, pl. 316. 1802; non *Epilobium subulatum* (Hausskn.) Rydb., 1913.

2. **Epilobium densiflorum** (Lindl.) Hoch & Raven, *comb. nov.* BASIONYM: *Oenothera densiflora* Lindl., Bot. Reg. 19: pl. 1593. 1833. *Boisduvalia douglasii* Spach, *Hist. Nat. Vég.* 4:385. 1835, pro syn. *Boisduvalia densiflora* (Lindl.) S. Watson, *Bot. California* 1:233. 1876. TYPE: Lindl., Bot. Reg. 19: pl. 1593. 1833; plant raised from seeds sent from "Northern California" by Douglas in 1831 (LECTOTYPE, designated by Raven & Moore [1965]).

3. **Epilobium pallidum** (Eastwood) Hoch & Raven, *comb. nov.* BASIONYM: *Boisduvalia pallida* Eastwood, Leafl. W. Bot. 2:54. 1937. TYPE: U.S.A. California: Modoc Co., Goose Valley, George Dillman Ranch, 11 July 1912, *Eastwood 1021* (HOLOTYPE: CAS 243301; Isotypes: GH,POM,US).

Boisduvalia macrantha A. Heller, Muhlenbergia 2:101. 1905; non *Epilobium macranthum* Hook., 1840.

4. **Epilobium torreyi** (S. Watson) Hoch & Raven, *comb. nov.* BASIONYM: *Oenothera torreyi* S. Watson, Proc. Amer. Acad. Arts 8:600. 1873. *Boisduvalia torreyi* (S. Watson) S. Watson, *Bot. California* 1:233. 1876. TYPE: U.S.A. California: Santa Clara Co., New Almaden, 1865, *Torrey 109* (LECTOTYPE, designated by Munz (1941): GH; Isolectotype: NY).

Boisduvalia stricta (A. Gray) E. Greene, *Fl. Francisc.* 225. 1891. *Gayophytum strictum* A. Gray, Proc. Amer. Acad. Arts 7:340. 1868; non *Epilobium strictum* Muhl., 1813.

Epilobium sect. **Currania** (Munz) Hoch & Raven, *comb. nov.* BASIONYM: *Boisduvalia* Spach. sect. *Currania* Munz, Darwiniana 5: 127. 1941. TYPE: *Epilobium cleistogamum* (Curran) Hoch & Raven, selected by Raven & Moore (1965:251).

5. **Epilobium cleistogamum** (Curran) Hoch & Raven, *comb. nov.* BASIONYM: *Boisduvalia cleistogama* Curran, Bull. Calif. Acad. Sci. 1:12. 1884. *Onothera cleistogama* (Curran) H. Lév., *Monogr. Onothera* 304, 312. 1908. TYPE: U.S.A. California: Solano Co., near Elmira, "May" 1883, *Curran s.n.* (LECTOTYPE, designated by Raven & Moore (1965), CAS 126; Possible isolectotype: GH).

6. **Epilobium pygmaeum** (Speg.) Hoch & Raven, *comb. nov.* BASIONYM: *Oenothera pygmaea* Speg., Anales Soc. Ci. Argent. 48:46. 1899. *Boisduvalia pygmaea* (Speg.) Munz, Physis 11:278. 1933. TYPE: ARGENTINA. Chubut, Chonkenk-aik, 1 Aug. 1897, *Ameghino s.n.* (HOLOTYPE: LPS not seen).

Boisduvalia glabella (Nutt.) Walp., Repert. Bot. Syst. 2:89. 1843. *Oenothera glabella* Nutt. *in* Torr. & A. Gray, *Fl. N. Amer.* 1:505. 1840; non *Epilobium glabellum* G. Forst., 1786.

ACKNOWLEDGMENTS

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A NEW SPECIES OF *EPILOBIUM* (ONAGRACEAE) IN CALIFORNIA

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ABSTRACT

Epilobium howellii, a new species from California, is described, and compared with similar species in the region. An uncommon plant marked by glandular hairs all over its stems, it is restricted to wet, possibly boggy, areas of the Sierra Nevada Mountains.

KEY WORDS: Onagraceae, *Epilobium*, California

A specimen of *Epilobium* collected in 1975 at Yuba Pass in the northern Sierra Nevada Mountains of California, and recollected in 1981 to obtain seeds for experimental cultivation, proved to be, surprisingly, an undescribed species. A search through hundreds of personal collections and thousands of herbarium specimens on loan for ongoing monographic work on North American *Epilobium* turned up a few additional specimens from elsewhere in the Sierra Nevada, which helped to establish the distinctness of the new taxon. A thorough search of the literature established that it has not been described before. Because the morphological distinctions among many species of *Epilobium* are fine, clear taxonomic keys are few, and the genus has a reputation (sometimes overstated) for hybridization, a conservative taxonomic approach to the delimitation of species in the genus (Trelease 1891; Raven & Raven 1976) is clearly warranted. Nevertheless, observations of the plant in the field, the herbarium, and the greenhouse support recognition of the following new species of *Epilobium*, which would be placed into section *Epilobium*:

Epilobium howellii Hoch, *sp. nov.* TYPE: U.S.A. California: Sierra Co., Yuba Pass summit, along CA Highway 49; 39° 39′ N, 120° 30′ W; scattered population among grasses and moss in semi-open *Salix* swales; elev. 2,040 m; 27 Jul 1975, *Hoch 665* (HOLOTYPE: MO).

Herba perennis tenuis, brevibus filiformibus foliosibus stolonibus; caulis undique glandulosus; folia sessilia, 4-20 mm longa, rotundata vel lanceolata; petala alba, 2-3 mm; stigma capitatum; capsulae 35-45 mm longae, subglabrae, pedicelli 25-40 mm; semina 0.8-1.1 mm longa, vix papillosa.

Delicate perennial herb, forming short threadlike stolons with scattered minute leaves. Stems 8-20 cm tall, densely glandular, terete, loosely clumped. Leaves sessile, the blades 4-20 mm long, round to lanceolate or narrower above, tip obtuse to subacute above, margins finely denticulate, stigillose mainly on veins or all over on upper leaves. Inflorescence erect. Flowers small, subcleistogamous; floral tube 0.4-0.8 mm deep; sepals 1.5-2.0 mm long; petals 2-3 mm long, white; stamens in two unequal sets, the longer ones shedding pollen onto capitate stigma prior to petal expansion. Capsules 35-45 mm long, subglabrous, on pedicels 25-40 mm long. Seeds 0.8-1.1 mm long, the surface low papillate; coma dingy, easily detached. $2n = 36$.

Distribution: Scattered locations in the high Sierra Nevada Mountains of California, in Fresno, Mono, and Sierra counties; in mossy meadows and swales, at 2000-2700 m elevation.

Phenology: Flowering period: July-early August; fruiting period: August-October.

Representative specimens examined: U.S.A. California: Fresno Co.: 3 mi. E of Huntington Lake, *Hoch 486* (MO,RSA); 1 mi. SW of Portal Forebay, *Hoch 503* (MO). Mono Co.: Twin Lakes, south shore, *Hoch 533* (MO). Sierra Co.: Yuba Pass summit, *Wagner 4550* (MO).

Chromosome count: $n = 18$, count provided by Warren L. Wagner, from plants cultivated at Missouri Botanical Garden, *Hoch M2616* (MO), from seed source: *Wagner 4550.*

With great respect, I name this plant after John Thomas Howell, enthusiastic collector of Californian epilobiums and observant student of the Sierran flora, in honor of his 90th birthday. This species is described now in order to make the name available for the treatment of *Epilobium* in *The Jepson Manual: Higher Plants of California.*

Epilobium howellii has a similar small, delicate stature, with spreading threadlike stolons, to that of *E. oregonense* Hausskn., but differs from it and most other North American species of *Epilobium* (Hoch 1993; Munz 1965) in having stems covered with glandular pubescence. The flowers are strikingly and consistently small (petals not more than 3 mm long), possibly cleistogamous, and the leaves never more narrow in shape than lanceolate. This combination of features, especially the unusual pattern of pubescence, distinguishes this species also from the so called Alpinae group (Haussknecht 1884), which are of similar habit and stature.

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I thank the National Science Foundation for support of this work through BSR89-06848, Warren L. Wagner for recollection of the type population in 1981 to obtain seeds, and for the chromosome count, and Peter H. Raven for his continued support, encouragement, and useful discussion of this work.

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Phytologia (December 1992) 73(6):463.

ERRATUM

In formatting a recent article G.L. Nesom for printing (Taxonomic notes on *Erigeron* [Asteraceae: Astereae] of California, Nevada, and Arizona. Phytologia 73:186-202. 1992), the editor made changes (p. 198) in the submitted manuscript that did not conform to the intent of the author. Following is the version as originally submitted by Nesom, with the new combination intended to place *E. austinieae* at equivalent (varietal) rank with *E.* var. *chrysopsidis* and *E.* var. *brevifolius*, and which makes only the claim that a trinomial is being validated (see ICBN Art. 24). The new varietal combination can still be regarded as validly published in Phytologia 73:198. 1992.

"**Erigeron chrysopsidis** A. Gray

Subsp. **chrysopsidis**

Var. **chrysopsidis**

Var. **brevifolius** Piper, Bull. Torrey Bot. Club 27:395. 1900. TYPE: Oregon, [Wallowa Co.,] subalpine ridge of the Wallowa Mts. near the [Wallowa] Lake, 29 Jul 1899, *W. C. Cusick 2270* (Holotype: WS; isotypes: GH!, MO!, NY!).

Subsp. **austiniae** (E. Greene) Cronq., Brittonia 6:196. 1947. Based on *E. austiniae* E. Greene (below)

Var. **austiniae** (E. Greene) Nesom, comb. et stat. nov. *Erigeron austiniae* E. Greene, Erythea 3:100. 1895. TYPE: California, Modoc County, Davis Creek, May 1894, *Mrs. R. M. Austin s.n.* (Lectotype, designated here: ND-G; isolectotypes: NY!, PH, UC)."

Phytologia (December 1992) 73(6):464-472.

BOOKS RECEIVED

Agricultural Plants, Second Edition. R.H.M. Langer & G.D. Hill. Cambridge University Press, 40 West 20th Street, New York, New York 10011. 1992. xiv. 387 pp. $89.95 (hardcover); $29.95 (paper). ISBN 0-521-40545-9 (hardcover); 0-521-40563-7 (paper).

This volume covers primary herbaceous species, and those most likely to be encountered in temperate and subtropical areas. The book has introductory chapters about human population growth and the importance of crop production, as well as information on plant morphology. These chapters are followed by summaries of the major plant families containing important agricultural crops. Within each family, discussions generally treat each genus separately. The final chapter is a discussion of physiological basis of crop yields.

Agricultural Policies in Developing Countries. Frank Ellis. Wye Studies in Agricultural and Rural Development. Cambridge University Press, 40 West 20th Street, New York, New York 10011. 1992. xvi. 357 pp. $69.95 (hardcover); $29.95 (paper). ISBN 0-521-40004-x (hardcover); 0-521-39584-4 (paper).

The entire first section of this book deals with analysis of agricultural policy. Factors such as markets, political system, social status, and concepts of policy analysis processes are treated there. Part two comprises descriptions of various policies affecting agriculture. Policies discussed include pricing, marketing, agricultural supports (input), credit, mechanization, land reform, research, and irrigation. The final section includes discussions of nonagricultural policies (such as women's issues and policies on food distribution) with significant impact on agricultural policy.

Anales del Instituto de Biología, Serie Botánica. Volume 62, Number 1. Fernando Chiang Cabrera (ed.). Universidad Nacional Autónoma de México, Coordinador de la Biblioteca del Instituto de Biología, Apartado Postal 70-233, 04510 México, D.F., México. 1991. 106 pp. Price unknown (paper). ISSN 0374-5511.

Five articles in this volume cover topics ranging from ethnobotanical studies, to phytochemical examinations, to physiological ecology, and classical taxonomy. Each article is accompanied by both a Spanish and English abstract. The articles themselves are in either Spanish or English.

Anales del Instituto de Biología, Serie Botánica. Volume 62, Number 2. Fernando Chiang Cabrera (ed.). Universidad Nacional Autónoma de México, Coordinador de la Biblioteca del Instituto de Biología, Apartado Postal 70-233, 04510 México, D.F., México. 1991. 180 pp. Price unknown (paper). ISSN 0374-5511.

Five articles in this volume cover topics ranging from sampling aflatoxins in peanut butter to floristic studies and descriptions of new species. Each article is accompanied by both a Spanish and English abstract. The articles themselves are in either Spanish or English.

Annual Review of Entomology, volume 37. Thomas E. Mittler, Frank J. Radovsky, & Vincent H. Resh. Annual Reviews Inc., 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94306. 1992. viii. 688 pp. $44.00 [$49.00 outside U.S.A.] (cloth). ISBN 0-8243-0137-4. ISSN 0066-4170.

Twentysix papers on topics ranging from labor allocations in insect societies, to mode of action of bacterial parasite toxins, to criminal forensic uses of entomology are found in this volume. Over fifty authors have contributed to these articles. Major themes (several papers each) are pest management and host/parasite relationships.

Biochemistry and Molecular Biology of Plant-Pathogen Interactions. C.J. Smith (ed.). Proceedings of the Phytochemical Society of Europe 32. Oxford Science Publications, Clarendon Press, Oxford University Press, Walton Street, Oxford OX2 6DP, Great Britain. Available in the United States from Oxford University Press, 200 Madison Avenue, New York, New York 10016. 1991. xvi. 291 pp. Price unknown (hardcover). ISBN 0-19-857734-6.

Seventeen papers produced by 59 authors comprise this volume. As might be expected from the series title, European researchers are well represented. Most of the papers deal with some aspect of molecular biology, with very few strictly biochemical or phytochemical in nature. Some of the articles treat specific host/pathogen problems, while others cover groups of pathogens and/or hosts.

The Biology of Vines. Francis E. Putz & Harold A. Mooney (eds.). Cambridge University Press, 40 West 20th Street, New York, New York 10011. 1992. xvi. 526 pp. $120.00 (cloth). ISBN 0-521-39250-0.

Many of the eighteen papers (written by 25 authors) comprising this book were presented at a symposium on vines. Topics covered include anatomy and morphology, distribution and evolution, water transport, metabolism (primary and secondary), ecological attributes, reproduction, and economic importance.

Cuadernos del Instituto de Biología 13, Contribución a la Biología Mexicana por Helia Bravo Hollis: Una Guía Bibliográfica. Armando Butanda & Alfonso Delgado Salinas. Instituto de Biología, Universidad Nacional Autónoma de México, Apartado Postal 70-233, 04510, México, D.F., México. 1991. 44 pp. Price unknown (paper). ISBN 968-36-2110-4.

This volume includes a summary of the scientific activities (especially the botanical endeavors) of Helia Bravo Hollis. Doctor Hollis primarily studied cacti, but her interests also dealt with other plants, and botanical biographies, and protozoans. Her publications, new taxa, and taxa named in her honor are listed.

Endocytosis, Exocytosis and Vesicle Traffic in Plants. C.R. Hawes, J.O.D. Coleman, & D.E. Evans (eds.). Society for Experimental Biology, Seminar Series 45. Cambridge University Press, 40 West 20th Street, New York, New York 10011. 1992. xiv. 252 pp. $85.00 (hardcover). ISBN 0-521-32844-6.

The volume presents twelve papers by a total of 32 authors. Papers treat ultrastructure, molecular characteristics, isolation procedures, and examination techniques of vesicles from various types of cells. The book concludes with a summary of possible future research in this field.

The Gene Civilization. François Gros. Translated from the French by Lee F. Scanlon. McGraw-Hill Horizons of Science Series, McGraw-Hill, Inc., 1221 Avenue of the Americas, New York, New York 10020. 1992. 136 pp. $9.95 (paper). ISBN 0-07-024963-6.

This book as part of a series presenting science to the nonscientific public, deals with concepts of molecular biology, advances in biotechnology and the ethical issues that future advances in biotechnology and molecular biology may present.

Genetics and Conservation of Rare Plants. Donald A. Falk & Kent A. Holsinger (eds.). Oxford University Press, 200 Madison Avenue, New York, New York 10016. 1991. xviii. 283 pp. $49.95 (cloth). ISBN 0-19-506429-1.

The core of this book consists of papers from a conference on rare plants held in March 1989. Additional papers were written specifically for the book and not included in the conference. A total of fourteen papers from 26 authors are included. Major themes of the book are population biology/genetics of rare plants, sampling of genetic diversity in rare plants, use of transported collections, and strategies for conserving genetic diversity.

Jeff Ball's 60-Minute Vegetable Garden, Just One Hour a Week for the Most Productive Vegetable Garden Possible. Jeff Ball. Collins Books, MacMillan Publishing Company, 866 Third Avenue, New York, New York 10022. 1992. xii. 228 pp. $13.00 [$16.95 in Canada] (paper). ISBN 0-02-030376-9.

A practical guide to home gardening, this book not only suggests activities for the gardener, but details how to accomplish the suggested activity. For example in the section on raised beds, the author not only discusses the pros and cons of raised beds, and suggests that they be used, but the book includes plans (with a shopping list, and information on tools needed, etc.) to construct frames for raised beds. Similar information appears for constructing trellises, compost bins, irrigation systems, and other items.

Life in the Universe. Jean Heidemann. Translated from the French by Isabel A. Leonard. McGraw-Hill Horizons of Science Series, McGraw-Hill, Inc., 1221 Avenue of the Americas, New York, New York 10020. 1992. 113 pp. $9.95 (paper). ISBN 0-07-027887-3.

This book as part of a series presenting science to the nonscientific public, deals with cosmic evolution, processes leading to the existence of life, and prospects of extraterrestrial life (intelligent or otherwise).

Magic Gardens, A Modern Chronicle of Herbs and Savory Seeds. Rosetta E. Clarkson. Foreword by Sal Gilbertie. American Gardening Classics. Collier Books, MacMillan Publishing Company, 866 Third Avenue, New York, New York 10022. 1992. xxii. 369 pp. $12.95 [$16.95 in Canada] (paper). ISBN 0-02-030976-7.

Drawing from the publications of herbalists such as Gerard, Johnson, Matthioli, and Parkinson, this book contains information on cultivation and uses for many of the plants studied by these early authors. The book is organized around constructing gardens on a theme (pickling, scents, symbols, etc.).

The Manual of Cultivated Orchid Species, Third Edition. Helmut Bechtel, Phillip Cribb, & Edmund Launert. The MIT Press, 55 Hayward Street, Cambridge, Massachusetts 02142. 1992. 585 pp. $85.00 (cloth). ISBN 0-262-02339-3.

The first section of this book contains general information about orchid taxonomy, ecology, and cultivation. Most of the text is devoted to alphabetically arranged descriptions of each genus and species of orchids known to be cultivated. Generic descriptions include morphological descriptions, distribution information, number of species, etymological information, taxonomy, type species listing, and cultivation information. Species descriptions contain morphological descriptions, distribution information, historical notes, and synonymy. The classification system of Dressler (*The Orchids, Natural History and Classification* [1981. Harvard University Press.] and modified in Telopea [2(4):413-424. 1983.]) is followed. The book contains over 140 pages of exquisite color plates.

New Flora of the British Isles. Clive Stace. Cambridge University Press, 40 West 20th Street, New York, New York 10011. 1992. xxx. 1226 pp. $75.00 (flexible waterproof). ISBN 0-521-42793-2.

This book includes pteridophytes and gymnosperms as well as angiosperms. The text includes plants found on the outer islands (Outer Hebrides, Orkney, Shetlands, Scilly, and Channel islands) as well as the larger land masses of the British Isles. In addition to the native flora, Stace has included non-native species regularly encountered within the area (for instance, date palm is included since even though they are killed by the first frosts of the year, plants are regularly encountered as seedlings in garbage piles). This approach has added to the length of the book, but significantly improved its usefulness for those not familiar with the flora and which species might be native as opposed to non-native. The book has a cover designed for field use, but its thickness makes it rather bulky for a pocket.

The New Perennials Preferred. Helen Van Pelt Wilson. Foreword by Elvin McDonald. American Gardening Classics. Collier Books, MacMillan Publishing Company, 866 Third Avenue, New York, New York 10022. 1992. xx. 315 pp. $15.95 [$19.95 in Canada] (paper). ISBN 0-02-082661-3.

The first section of the book is devoted to general information on gardening, and cultivating perennials in particular. Most of the text comprises a seasonally arranged discussion of cultivated (primarily herbaceous) perennials. The seasonal discussion includes a substantial treatment of plants attractive during the winter. Lists of plants suitable for specific purposes (fragrance production, shade tolerance, etc.) are also included.

Nitrogen Metabolism of Plants. Proceedings of the Phytochemical Society of Europe, 33. K. Mengel & D.J. Pilbeam (eds.). Oxford Science Publications, Oxford University Press, 200 Madison Avenue, New York, New York 10016. 1992. xii. 289 pp. $89.00 (hardcover). ISBN 0-19-857752-4.

Fortynine researchers from Canada and the United States, as well as Europe, have contributed sixteen papers to this volume. Most of the papers deal with nitrogen fixation or transport, with other papers on metabolism of nitrogen, and nitrogen based plant toxins.

Our Changing Climate. Robert Kandel. Translated from the French by Nicholas Hartmann. McGraw-Hill Horizons of Science Series, McGraw-Hill, Inc., 1221 Avenue of the Americas, New York, New York 10020. 1992. 126 pp. $9.95 (paper). ISBN 0-07-033710-1.

This book as part of a series presenting science to the nonscientific public, deals with general concepts of climate, models for study of climate, prospects of the greenhouse effect and ozone depletion, and political influences on climate research.

Physiology of Trees. A.S. Raghavendra (ed.). John Wiley & Sons, Inc., 1 Wiley Drive, Somerset, New Jersey 08875. 1991. xii. 509 pp. $110.00 (cloth). ISBN 0-471-50110-7.

Thirtythree authors contributed twenty papers to form this book. Topics include photosynthesis and respiration, photosynthate distribution, nitrogen fixation, water relations, seedling growth, wood formation, periodicity, flowering, growth forms, abscission, responses to stress, tissues culture, use of growth regulators, physiological modeling, and wound responses.

Practical Taxonomic Computing. Richard J. Pankhurst. Cambridge University Press, 40 West 20th Street, New York, New York 10011. 1992. xii. 202 pp. $49.95 (hardcover). ISBN 0-521-41760-0.

After some brief introductory material, this book gets to the meat of the issues of taxonomic computing with discussions of databases, principles of classification, conventional identification procedures, identification procedures facilitated by computer, and sample applications of computer identification. The final chapter includes a discussion of expert systems technology and its potential impact on taxonomic computing. An appendix contains interesting mathematical derivations of formulae for estimating usefulness of taxonomic characters.

Sweet Potato An Untapped Food Resource. Jennifer A. Woolfe. Published in collaboration with the International Potato Center, Lima Perú, by the Cambridge University Press, 40 West 20th Street, New York, New York 10011. 1992. xvi. 643 pp. $130.00 (hardcover). ISBN 0-521-40295-6.

This comprehensive summary on use of sweet potato for human and livestock consumption includes chapters on history of cultivation, chemical constituents, nutritive value, toxicity, storage, processing, cooking, livestock utilization, and human consumption methods and histories. An appendix contains recipes for sweet potato dishes from around the world.

Vegetation of New Zealand. Peter Wardle. Cambridge University Press, 40 West 20th Street, New York, New York 10011. 1991. xx. 672 pp. Price unknown (cloth). ISBN 0-521-25873-1.

A comprehensive treatment of the vegetation of this island nation. The book includes sections on the biotic and abiotic environment, origins and history of the flora, growth forms in various habitats, reproductive processes, and a discussion of a vegetation classification system. The classification system is essentially hierarchical, with major vegetation types (forest, grassland, etc.) broken into species or region specific subunits. Separate discussions of some of the outlying islands are included.

Yardening, The Nongardener's Guide to Creating a Beautiful Landscape. Jeff & Liz Ball. MacMillan Publishing Company, 866 Third Avenue, New York, New York 10022. 1992. xiv. 268 pp. $24.95 [$32.50 in Canada] (cloth). ISBN 0-02-506431-2.

This book, intended for persons with an interest in taking care of their garden (yarden), but without extensive experience or time, deals with topics ranging from taking care of the grass to growing flowers and vegetables. The information is presented in a readily accessible fashion with references for further details.

Phytologia (December 1992) 73(6):473.

INDEX TO AUTHORS, VOLUME 73

Phytologia (December 1992) 73(6):474-508.

INDEX TO TAXA, VOLUME 73

Phytologia (December 1992) 73(6):509.

CORRECTIONS AND ADDITIONS

Volume 71, number 6, inside front cover, add to Contents:

"Index to authors, volume 71. 486

Index to taxa, volume 71. 487

Index to reviewers, volume 71. dotfill 510

Disposition of manuscripts received for volumes 70 and 71. ..... 512"

Volume 72, number 1, page 37, line 5 of the Introduction, replace 'species." This' with 'species". This'.

Volume 72, number 1, page 38, line 1, replace "Replaced synonym" with "REPLACED SYNONYM".

Volume 72, number 1, page 38, line 28, replace "LECTOTYPE [here" with "LECTOTYPE NOV. [here".

Volume 72, number 2, cover, L.E. MCKINNEY is the second author for the paper entitled "A nomenclatural change in *Viola* (Violaceae)

Volume 72, number 2, page 99, line 3 of abstract, replace "(= *Coreopsis scopulorum*)" with "(= *Coreopsis scopulorum* Sherff)".

Volume 72, number 2, page 99, line 5 of abstract, replace "(= *Coreopsis morotonensis*)" with "(= *Coreopsis morotonensis* Sherff)".

Volume 72, number 2, page 99, line 6 of abstract, replace "(= *Coreopsis odora*)" with "(= *Coreopsis odora* Sherff)".

Volume 72, number 2, page 99, line 7 of abstract, replace "(= *Bidens paupercula* var. *filirostris*)" with "(= *Bidens paupercula* Sherff var. *filirostris* P. Taylor)".

Volume 73, number 1, page 50, replace "*Sphaqnum*" with "*Sphagnum*."

Volume 73, number 3, page 198, see detailed statement on page 463 of volume 73, number 6.

Phytologia (December 1992) 73(6):510-511.

INDEX TO REVIEWERS, VOLUME 73

The editor express his most sincere appreciation to the following individuals. These are persons who have reviewed papers that were submitted for publication in volume 73 of Phytologia. Without the willingness and diligence of these reviewers, the task of the editor would be much more difficult, and the quality of the papers published would be lessened. To each of you, I offer my most sincere thanks. Michael J. Warnock, Editor.

Baldwin, B.G.
Barneby, R.
Barrie, F.R.
Berry, P.
Boufford, D.
Boyd, S.
Breedlove, D.
Brothers, L.
Brown, L.E.
Brummitt, R.K.
Canne-Hilliker, J.
Capels, K.
Carter, R.
Clark, W.D.
Clements, M.A.
Cronquist, A.
Crosby, M.
Crawford, D.
Dodd III, T.
Dorn, B.
Dressler, R.L.
Dutton, B.
Ertter, B.
Escobar, L.A.
Felger, R.
Funk, V.A.
Grant, J.
Gutknecht, K.
Hartman, R.
Holmgren, N.
Jacobs, S.
Jansen, R.
Jarvis, C.E.
Jeffrey, C.
Jones, G.D.
Jury, S.L.
Kartesz, J.
Kral, R.
Lellinger, D.B.
Lievens, A.
Lonard, R.I.
de la Luz Arreguín, M.
MacRoberts, D.T.
Martínez, M.
Mason, C.
Mayfield, M.
Maze, J.
McDaniel, S.

McVaugh, R.
Moore, D.M.
Nesom, G.L.
Nicolson, D.H.
Panero, J.
Peterson, P.
Pinkava, D.J.
Powell, A.M.
Pruski, J.
Raj, N.
Ramamoorthy, T.P.
Reveal, J.L.
Riggins, R.L.
Robinson, H.
Rodríguez, C.
Sanders, A.C.
Schatz, G.E.
Smith, S.
Solomon, J.
Soule, J.
Spellenberg, R.
Strong, M.
Sundell, E.
Terrell, E.E.
Thorne, R.F.
Todzia, C.A.
Townsend, A.M.
Turner, B.L.
Wallace, B.J.
van der Werff, H.
Wiersma, J.
Wilken, D.
Williams, N.A.
Wipff, J.K.
Wurdack, J.

Phytologia (December 1992) 73(6):512.

DISPOSITION OF MANUSCRIPTS RECEIVED FOR VOLUMES 72 AND 73

Manuscripts listed below include those received after examination by two or more reviewers. A note of appreciation to reviewers is found on page 510 with the list of reviewers. Manuscripts received without review are not considered for publication until review has been completed.

Manuscripts received: 135

Manuscripts accepted without revision: 8

Manuscripts accepted after revision: 113

Manuscripts returned to authors without publication: 7

Manuscripts currently under revision: 7

Manuscripts currently accepted but not yet published: 5

Papers published: 116

Days elapsed from receipt of manuscript to publication (includes only those manuscripts selected for publication): mean = 45; range = 22-141

Days elapsed from acceptance for publication to publication of manuscript: mean = 28; range = 15-51

Information for Authors

Articles from botanical systematics and ecology, including biographical sketches, critical reviews, and summaries of literature will be considered for publication in PHYTOLOGIA. Manuscripts may be submitted either on computer diskette, or as typescript. Diskettes will be returned to authors after action has been taken on the manuscript. Diskettes may be 5.25 inches or 3.5 inches and may be written in any IBM or MacIntosh compatible format. Typescript manuscripts should be single spaced and will be read into the computer using a page scanner. The scanner will read standard typewriter fonts but will not read dot matrix print. Manuscripts submitted in dot matrix print cannot be accepted. Use underscore (not italics) for scientific names. Corrections made on typescript manuscripts must be complete and neat as the scanner will not read them otherwise. Language of manuscripts may be either English or Spanish. Figures will be reduced to fit within limits of text pages and therefore, should be submitted with an internal scale and have dimensions proportional to those for text pages. Legends for figures should be included in figures whenever possible. Each manuscript should have an abstract and key word list. Specimen citations should be consistent throughout the manuscript. Serial titles should be cited with abbreviations used in *Botanico Periodicum Huntianum*. References cited only as part of nomenclatural summaries should not appear in Literature Cited. Nomenclatural work should include one paragraph per basionym and must provide proper (as defined by the current *International Code of Botanical Nomenclature)* citation of sources of epithets and combinations.

Authors should arrange for two workers in the appropriate field to review the manuscript before submission. Copies of reviews should be forwarded to the editor with the manuscript. Manuscripts will not be published without review.

Cost of publication is currently $13.00 US per page for publication without reprints. Publication with 100 reprints is provided for $18.00 US per page, 200 reprints for $21.50 US per page. Page charges are due with manuscript and no paper will be published before payment is received in full. Reprints must be ordered and paid for in advance. Page charges will be determined on the basis of a typescript page (single spaced, 10 points, blank line between paragraphs) with all type inside a rectangle 143 mm (horizontal) by 219 mm (vertical), not including running head and page number. Title page should include title, author(s) name(s), and address(es). Two blank lines should appear above and below section headings (Abstract, Discussion, Literature Cited, etc.) in the manuscript. No extra charge is made for line drawings provided they conform to limitations of size and proportion for normal text. Halftones require an extra charge of $10.00 US per page.